

briefly described in tables that accompany each chapter. The reference section contains 105 citations from the late 1950s through 1989. A glossary of entomological terms is provided. The forest tree species of Ghana, their local names, trade names, and commercial status are listed in an appendix.

The authors wrote this book with the practicing forester and forest entomologist in mind and for use as a textbook or reference for forestry students in West Africa. *Forest Entomology in West Tropical Africa* should be of interest to anyone who desires an introduction to the principle forest insect pests of Ghana and adjacent countries.

It is unfortunate that the book was not carefully edited—misspelled words (including some scientific names), awkward sentences, and many inconsistencies in the text detract from its readability. The poor quality of several line drawings and photographs makes them of limited diagnostic value. This is particularly annoying because the authors state that illustrations and photographs were included to enhance recognition of important pests and their damage. Many fall short of this goal. In addition, the high cost of this book will preclude it from most personal libraries, especially those of students.

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Phytochemical Induction by Herbivores

Douglas W. Tallamy & Michael J. Raupp [eds.]
Wiley, New York, 1991

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DURING THE PAST 20 YEARS, rapid progress has been achieved in the study of wound-initiated phytochemical, morphological, and phenological processes that protect plants against herbivores. A comprehensive review in this area of research is needed, because of the tremendous volume of conflicting literature that has been published. *Phytochemical Induction by Herbivores* addresses this need by providing a multiauthor book that focuses on specific model systems, provides critical evaluations of published literature, and offers suggestions for future research.

The book is divided into three parts. Part I focuses on the plant by featuring the physiological, morphological, and phytochemical responses of plants to herbivore attack. Coleman and Jones begin this section by presenting a phytocentric model that describes how plant genotype, ontogeny, and phenology regulate the acquisition, allocation, and partitioning of resources, and how the biotic and abiotic environment contribute to this process in predictable ways. All of these factors

significantly influence inducible phytochemicals, and ultimately, the quality and suitability of plant tissues for herbivores. However, many of these factors are overlooked by researchers. The authors offer this phytocentric model as a framework for the study of inducible responses and to reduce variation in data from phytochemical induction experiments. The section also includes a chapter by Tuomi, Fagerström, and Niemälä that challenges the notion that the primary function of inducible responses is defense. They offer evidence suggesting that carbon-based inducible phytochemicals evolved as secondary metabolites that subsequently acquired the ability to defend plants against pathogens and herbivores. Thus, defense can account only partially for the overall variation in carbon-based secondary compounds. Hartley and Lawton present a well-documented argument that questions the adaptive significance of rapidly induced phenolics in birch foliage as a defense against insects. They suggest that these compounds act primarily as antimicrobial agents.

Part II examines the impact of inducible plant responses on herbivore fitness, behavior, population dynamics, and community structure. Bryant, Danell, Provenza, Reichardt, Clausen, and Werner attempt to resolve the conflicting observations that herbivory alters the food value of deciduous woody plants. They suggest that long-term induction is not an active defense response, but, rather, a passive response to nutrient stress caused by defoliation. Tallamy and McCloud provide an excellent reexamination of the effects of inducible cucurbitacins on the fitness and feeding behavior of squash and cucumber beetles. They provide strong evidence that cucurbitacins have a primary function in wound repair and function secondarily as defense against selected herbivores. Other chapters focus on the relationship between wound-induced changes in plant quality and spatial distribution of insects, and the evidence supporting and refuting the role of plant proteinase inhibitors as effective herbivore defenses. Raffa reviews the formidable body of literature that focuses on the interactions between bark beetles and conifers. He argues that a wide variety of biotic and abiotic factors may act, to differing degrees, as elicitors or modifiers of histological and chemical changes in trees, thereby differentially influencing the population dynamics of bark beetles. Neuvonen and Haukioja summarize their pioneering studies examining the role of inducible resistance in the interaction between birch and herbivorous insects, detailing evidence for the rapid and delayed effects of induction on the success of herbivores, and emphasizing experimental pitfalls and limitations in the design and interpretation of induction studies. The last two chapters in this section focus on nonchemical changes that occur in plants following herbivory. The authors conclude that there is no strong ev-

idence to support the view that wound-initiated phenological, morphological, and architectural changes in the plant act as a major defense against herbivorous insects.

Part III explores the implications of employing inducible defenses to mitigate herbivory in agronomic systems. Kogan and Fischer begin the section with a review of the extensive literature on inducible soybean phytoalexins, the effects of these phytoalexins on herbivores, and the potential use of inducible plant defenses in integrated pest management programs. Benedict and Chang summarize their research on the ability of bacteria to induce phytochemical changes in cotton plants, and the effect of these changes on boll weevil preference and population growth. They conclude that the level of bacterially induced antibiosis and nonpreference to boll weevil is relatively low and unpredictable, and thus would not be an effective strategy against boll weevil populations in the field. Karban provides a thought-provoking chapter proposing criteria for evaluating the potency of plant inducible responses against insect populations, providing insights into how these criteria can be addressed, and evaluating the use of induced resistance as a practical management tool to reduce pest populations in the future.

The authors of each chapter present the conflicting results that appear in the literature, and attempt to bring some order to the confusion. They often challenge the currently accepted dogma, presenting well-documented cases for alternative viewpoints. The chapters in each of these sections are well-researched reviews focusing on specific aspects of phytochemical induction.

My strongest criticism of this book is the use of the term induction. Technically, induction refers to de novo synthesis of an enzyme in response to an environmental signal. However, a majority of the authors in this book use a relatively loose definition of induction: any qualitative or quantitative enhancement of a plant's defense mechanisms against pests in response to extrinsic physical or chemical stimuli. Clearly, the inability to adhere to the classical definition of induction results from a lack of information about the "inducible" systems. In many cases, not only do the authors not know whether the phytochemical is synthesized de novo, they do not know whether the reduction in suitability of the plant is due to a phytochemical. In addition, there is no justification to assume that the response is defensive. In fact, a number of the authors suggest that the primary function of specific responses is the repair of wounds. This area of research in insect-plant interactions is in its infancy, and this text provides an excellent review of the information reported to date. However, I would prefer the use of a term other than "induction" to describe this ill-defined phenomenon.

This book is a valuable resource for scientists working in the area of wound-initiated plant resistance. However, it is not appropriate as a textbook for students, as it is too expensive and does not provide comprehensive background information for those unfamiliar with this area of research.

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Sweet Potato Management: A Global Perspective

Richard K. Jansson & Kandukuri V. Raman [eds.]
Westview Press, Boulder, Colo., 1991

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IN IMPORTANCE WORLDWIDE, sweet potato ranks seventh among all food crops and second among root and tuber crops. Ninety-eight percent of world sweet potato production takes place in developing countries where the crop is important not only as a staple food, but also has a tremendous potential to meet the nutritional needs of an exploding population. Given the significance of this crop and the importance of pests as production constraints, one would expect the knowledge base and research activity in sweet potato pest management to be extensive. Such is not the case, however. This book, which resulted from an international conference on sweet potato management held in Florida in June 1989, emphatically illustrates the need for additional pest management research and implementation efforts on sweet potato in developing countries, where production constraints and pest problems are particularly severe.

The title promises a balanced treatment of pests in each major category: insects, pathogens, and weeds. This promise is not fulfilled. There is only one chapter devoted to plant-parasitic nematodes and one to insect-transmitted plant viruses. Neither fungal nor bacterial pathogens nor weed pests receives any treatment. Nonetheless, the book represents the most complete compilation and review of information on the biology and management of sweet potato insect pests currently available.

Although the logic behind the sequencing of chapters is not obvious (some chapters seem out of place within the book), Jansson and Raman have done a commendable job of editing the contributions. As a result, the book is informative and readable. It is remarkably free of the distracting variations in style and the repetitiveness that often characterize similar multi-author volumes.

The first chapter provides a global overview of sweet potato production and pest management